



## **The CHPM2030 H2020 Project: Combined Heat, Power and Metal extraction from ultra-deep ore bodies**

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The CHPM2030 project consortium is working on a novel technology solution that can provide both geothermal energy and minerals, in a single interlinked process. The CHPM technology involves an integrated approach to cross fertilize between two yet separated research areas: unconventional geothermal energy and mineral extraction. This places the project's research agenda onto the frontiers of geothermal resources development, mineral extraction and electro-metallurgy with the objectives of converting ultra-deep metallic mineral formations into an "orebody-enhanced geothermal system".

In the envisioned facility, an EGS is established on a 3-4 km deep ore mineralisation. Metal content from the ore body is mobilised using mild leaching and/or nanoparticles, then metals are recovered by high-temperature, high-pressure geothermal fluid electrolysis and gas-diffusion electroprecipitation and electrocrystallisation. Salinity gradient power from pre-treated geothermal fluids will also be used. In the project, all these will be carried out at laboratory scale (technology readiness level of 4-5), providing data for the conceptual framework, process optimisation and simulations. Integrated sustainability assessment will also be carried out on the economic feasibility, social impact, policy considerations, environmental impact and ethics concerns. During the last stage of the research agenda, the work will focus on mapping converging technological areas, setting a background for pilot implementation and developing research roadmaps for 2030 and 2050. Pilot study areas include South West England, the Iberian Pyrite Belt in Portugal, the Banatitic Magmatic and Metallogenic Belt in Romania, and three mining districts in Sweden.

The project started in January 2016 and lasts for 42 months. In the first phase, the metallogenesis of Europe was investigated and the potential ore formations have been identified. The rock-mechanical characteristics of orebodies have also been examined from an EGS perspective and the conceptual framework for an orebody-EGS has been formulated.

Metal extraction from geothermal resources provides added value to the system, which has the potential to increase financial feasibility of geothermal development. This approach can contribute to a Europe-wide growth in industrial applications of geothermal resources in the future. The project also thrives to connect thousands of scientists, engineers, and decision-makers by establishing co-operative links to already running on critical raw materials, geothermal energy and other technology-driven projects.